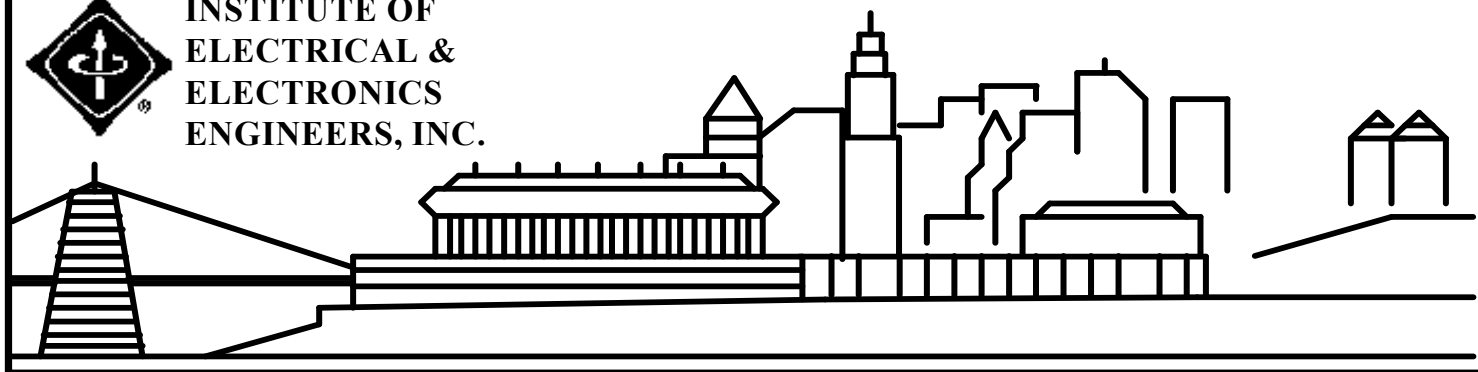




**INSTITUTE OF
ELECTRICAL &
ELECTRONICS
ENGINEERS, INC.**



APRIL 1994

IEEE CINCINNATI SECTION NEWSLETTER

APRIL MEETING: Tour of The Greater Cincinnati/Northern Kentucky International Airport

DATE: THURSDAY, APRIL 21, 1994

PLACE: Greater Cincinnati/Northern Kentucky International Airport

TIME: 7:00 P.M.

So that we can have an idea of the number of people to expect, please call Dee Scott at

459-8038 by NOON, Wed. April 20th

Please provide NAME, MEMBER # and COMPANY NAME when making reservations

ABOUT THE PRESENTATION

The tour will include a short slide presentation by Mr. Ted Bushelman which will provide a recap of the growth and history of the airport. The tour will also include the airport's new video media center and some of the more interesting details of the \$500 million airport expansion, including the underground connector and the Tram system which is being installed in the connector.

Please park in the Short Term Lot. Your parking ticket will be stamped so that you will not have to pay for parking. Meet in the baggage pickup area in front of Terminal #1.

BACKGROUND OF THE SPEAKER

Mr. Ted J. Bushelman has held the position of Director on the Airport Communications Department since 1967. Ted is charged with the responsibility of helping to acquaint the community at large with the airport, working closely with the news media to insure that the general public is kept abreast of major events at the airport and also overseeing the airport's in-house ad agency.

Ted has an extensive and varied educational background which includes a B.S. in Education from the University of Cincinnati, a B.S. in Radio and Television Production from the Cincinnati College Conservatory of Music and an Electronic Engineering Degree from the Ohio Mechanics Institute.

In addition to his community involvement through the airport, Ted has served on the boards of several area service agencies including Chairman of the Boone County Public Library Board; President of the Northern Ky. Chamber of Commerce; Transit Authority of Northern Kentucky; American Red Cross; Salvation Army; and Public Relations Chairman of the Cincinnati Chamber of Commerce.

Ted has also served as Chairman of the Public Relations Committee of the Airport Operators Council International and is a past recipient of the Public Relations Man of the Year award from the Public Relations Society of America.

CHAIRMAN'S MESSAGE

by Jim Everly

Last month's meeting featured Dr. Peter Kosel of the Department of Electrical and Computer Engineering at UC. Dr. Kosel presented an overview of his research in interests in Quantum Device Engineering at the University. A sincere thanks is extended to Dr. Kosel for presenting an interesting and stimulating program in quantum device technology.

The IEEE Strategic Planning Committee is in the process of developing a strategic plan which will carry IEEE into the 21st century. The plan focuses on meeting member needs in the 21st century. The following vision, developed by IEEE members and leaders, describes how the IEEE will carry out its mission as we enter the 21st century:

- The IEEE promotes public understanding and appreciation of the contributions made to society by engineers and scientists and is widely regarded as the primary source of reliable information and advice on public issues related to electrotechnology.
- The IEEE will ensure that high-quality educational opportunities are available to aspiring electrotechnology professionals and that lifelong learning opportunities are accessible to practicing professionals.
- The IEEE is a leader in providing high-quality, affordable, technical, educational and professional products, services and standards to serve members, the profession and the public.
- The IEEE provides its members a window through which to view global developments in electrotechnology, no matter in what part of the world the development occurs.
- The IEEE operates efficiently and allocates costs equitably among members and other users of its diverse products and services.

Is this vision accurate and meaningful for the Cincinnati Section? Moreover, how do we address these goals in developing strategic and operating plans for our Section, thereby moving it toward the IEEE vision of the future? Feedback on this issue would be greatly appreciated, or you can send your comments directly to IEEE.

As a reminder, the IEEE Cincinnati Section Executive Committee is scheduled for its Spring Quarter meeting on Thursday, April 28, 1994. If you have any items that you would like to have added to the agenda, please contact me at either my home or office telephone number.

FM RADIO DEVELOPMENT

by R. J. Reiman, Historian

Edwin Howard Armstrong had been known for the invention of the superheterodyne circuit for radio receivers and went on to development and advocacy of wideband frequency modulation (FM) for radio broadcasting. Did Armstrong invent FM ? This was bitterly disputed by RCA and only after Armstrong's tragic death did RCA settle with his estate on his patents, tacidly admitting his primary claim. Had David Sarnoff conceded this during Armstrong's life, it may have averted his suicide. Armstrong was a very proud man and wanted the recognition to an intense degree.

Should FM broadcasting be permitted ? This was a very easy answer, for the FCC, the industry and the public were clamoring for more licensable broadcast channels and the technical advances in fidelity that FM promised. Only RCA held back, for they were dominant in AM and didn't want a competitor for their vested interests.

What portion of the radio spectrum should be allocated to FM ? In the period before World War II, the FCC allocated forty 200-kHz channels in 8 MHz of spectrum space from 42 to 50 MHz for educational and commercial FM broadcasting, 5 and 35 respectively. The FCC raised the question "The effect of sky-wave interference until additional stations are placed in operation and --- later developments are known." The development of radar and FM broadcasting research during the war were to change the allocation. Meanwhile, following the allocation, 58 stations had construction licenses and 400,000 receiver sets were sold, many by Zenith. The War Production Board halted further development of FM on December 7, 1941.

At the beginning of the war, VHF technology was in its infancy, transistors did not exist, knowledge of the properties of VHF radio waves was limited and few engineers and technicians had training or experience in the design and maintenance of VHF equipment. All this would change with war-time experience. Another result was the war-time field measurements by the War Department and Bureau of Standards. An apparent problem existed at about 30MHz, the lower limit of the VHF range, in that certain abnormal ionospheric conditions, sky-wave transmission sometimes occurred, and this might cause interferences between stations at the end of their broadcast range, particularly in rural areas. Sky waves result from the reflection of radio signals by layers of ions in the upper atmosphere. Ionization is caused by the sun's rays with the degree varying from day to night, the latitude, the season, and the sun-spot cycle. The sky-wave propogation of short-waves (3 to 36 MHz) provides an effective long distance transmission medium during the daytime. Short-wave propogation is too weak to be of practical use for communications at frequencies above 30 MHz, but under abnormal conditions can cause objectional interference. The FCC had a case to reallocate FM frequencies to a higher range, and this would obsolete the 400,000 receivers already sold and Zenith's technical edge. RCA, however, would benefit since they had little investment in FM.

WELCOME TO NEW IEEE MEMBERS AND CURRENT IEEE MEMBERS WHO HAVE MOVED INTO THE SECTION

The following individuals are new IEEE members in the Cincinnati Section:

Michael A. Caputo	James A. Klug	Chris R. Tarnowiecky
Stanley L. Cohen	John J. Penix	Richard W. Tepe
Jeffrey S. Gilton	Wendell A. Strickland	D. E. Wilson

The following IEEE members have moved into the Cincinnati Section:

Radford M. Arner	Stephen A. Hockema	Brian H. Talbert
John A. Filippone	Jineng Jin	Fred J. Tyranski
Glen M. Gallagher	John F. Rowe	James N. Wisner
Scott C. Gass	Lynn A. Sines	Perry H. Ziel
Douglas A. Heilman		

IEEE NEWS

PISCATAWAY, N.J., March 11-- Industry 2000, an innovative two-day workshop that will focus on career opportunities for engineers through continuing education, has received substantial grants from The Sloan Foundation, The IEEE Foundation and Motorola Corp. The workshop, which is sponsored by IEEE will be held May 12-13 in Denver.

The Sloan Foundation, a philanthropic organization that supports education in the sciences, technology and management, donated \$27,000 and The IEEE Foundation, dedicated to furthering the field of engineering, gave \$15,000. Motorola, a frequent supporter of IEEE activities, provided \$5,000. "These generous donations are indicative of the interest of industry for professional development and career enhancement for engineers," stated Kenneth R. Laker, IEEE vice president of educational activities.

The goal of Industry 2000 is to address employee and employer issues in life-long learning. Ray Waddoups of Motorola University West and Mark Myers of Xerox Corp. are the principal speakers. Following the presentation, a series of structured panel discussions will be held. Leading the discussions will be notable industry educators including Alfred Moye, Hewlett-Packard Company; Bill Long, Texas Instruments; Peter Grosewald, IBM Corp and Susan Anderson-Khlief, Motorola University. The panel discussions will establish realistic goals and define workable strategies for effective continuing education. John Meredith, Hewlett-Packard and Michael Masten, Texas Instruments will serve as moderators at the panel discussions.

"The upcoming Industry 2000 is one of many forums provided by the IEEE to promote engineers' technical vitality," said Laker. "By focusing on life-long learning, this program will help engineers and their employers to be proactive in the challenges of globalization and rapid technological change."

For more information on Industry 2000, contact Peter Wiesner, manager of continuing education at 908-562-5000, fax 908-981-1686 or e-mail: p.wiesner@ieee.org.

PISCATAWAY, N.J., March 25-- The Communications Society of IEEE has launched a new publication, IEEE Personal Communication : The Magazine of Nomadic Communication and Computing. The publication covers technical and policy issues relating to personalized, location independent communications in all media and combinations of media and at all protocol layers.

According to Editor-in-Chief Hamid Ahmadi, "Personal Communications will keep readers in touch with the technologies for keeping in touch, technologies which have improved the feasibility of the work-at-home and remote office concept. In addition, businesses are demanding faster and easier access information and individuals are looking more to these technologies to manage their personal finances and enhance their lives."

IEEE Personal Communications targets individuals working with communications, computer systems and networking technologies and covers both wired and wireless communications including computing, mobile and portable communications, and personal services. Refereed, technical articles will come from IEEE members worldwide working in research and development at leading universities and companies.

The Communications Society is one of 37 IEEE Societies and Councils and is the fastest growing with 35,000 members worldwide.

WASHINGTON, D.C., April 2-- The IEEE U.S. Activities unit (IEEE-USA) recently hosted key congressional staffers for technology policy briefings on issues of major concern to the profession. The March 19 presentation on Capitol Hill was sponsored by the IEEE-USA Technology Policy Council and was attended by several dozen

congressional technology policymakers. In addition to introducing IEEE-USA to new members of Congress and staff, the event inaugurated a series of monthly seminars to be conducted by the unit for members and their staffs on a range of technology policy issues.

Charles K. Alexander, Jr., chairman of the IEEE United States Activities Board and IEEE vice president for professional activities, introduced the day's agenda by describing how IEEE-USA and its Technology Policy Council serve as important resources for federal legislators in shaping effective electrotechnology policy. Dr. Alexander also stressed the society's contention that national investment in technology pays off in increased quality of life for all Americans. Through historical examples, he urged his audience to realize that expenditures on technology, although sometimes great initially, are "not costs -- they're investments."

Joseph D. Bronzino, chairman of the IEEE-USA Technology Policy Council, presented the first issue briefing, "The Need for a Bioengineering Emphasis at the National Institutes of Health (NIH)." Noting that the US has traditionally led the world in pioneering medical technology advances that have extended the human lifespan by 40 years and greatly increased the quality of life, Dr. Bronzino warned that government-industry partnerships in other nations are greatly eroding American competitiveness in this area. He urged adoption of new NIH funding criteria and the establishment of a permanent biomedical engineering organization at NIH to stimulate the growth of beneficial new technologies.

J. Mark Pullen, co-vice chairman of the IEEE-USA Technology Policy Council, followed with a blueprint of "The Role of the Department of Commerce in US Technology Policy." He cited the lack of public and private spending on exploratory development as the primary cause of American loss of competitiveness in high-tech industries, and offered an outline of steps that the US Department of Commerce could take to provide focused support for pre-commercial technological development.

Robert S. Powers, also vice-chairman of the IEEE-USA Technology Policy Council, concluded the presentation with a briefing on "Telecommunications As Part of the National Information Infrastructure." Powers discussed the awesome opportunities presented by a telecommunications infrastructure for the next century, and offered a balanced view of the respective roles of the government and private sector in managing its development. Echoing his fellow presenters, he conclude: "IEEE-USA stands ready to assist Congress in further identifying opportunities and devising approaches to implement a 21st-Century telecommunications infrastructure." Powers is also chairman of the IEEE-USA Committee on Communications and Information Policy.

During the lively question-and-answer session and in conversations with event organizers afterwards, several participants thanked IEEE-USA for providing the technical expertise and coherent vision necessary to help guide them in formulating legislative policy on complex issues. IEEE- USA Technologiy Policy Council Chairman Bronzino expressed satisfaction with the closer working relationships forged by the day's event: "Our basic messages were very well-received. IEEE-USA has a depth and breadth of knowledge to share. We are here to help educate policy-makers in the technological components of policy issues. And we will continue to act as a resource for members of Congress and their staffs on electrotechnology policy issues that arise in the future."

Upcoming congressional briefings will address the role of medical technology in health care; the pre-commercialization technological innovation process; and research-and-development funding strategies for basic and applied research. In addition, the IEEE-USA Committee on Communications and Information Policy will sponsor an information exchange on telecommunications as part of the National Information Infrastructure on May 4-5 in Washington. For more information about the conference, call the IEEE-USA office at 202-785-0017.

MARCH MEETING UPDATE:

The following was submitted by Dr. Peter B. Kosel as a followup to his presentation in March on Advanced Semi-conductor Materials for Quantum Devices:

Of all the original fields of Electrical Engineering, Electronics has probably been the longest survivor. Moreover, it appears that it has not yet reached its peak of development nor that the peak will be reached in the near future. In its wake electronics has spawned new fields including digital signal processing, computer engineering, control engineering and optical communications. Also, it has given rise to developments in other fields such as mechanics and biomedical engineering. Among such developments are micromechanics and micromachining.

The general evolution of electronics may be perceived as the attempt by electrical engineers to encompass under the one identity all the technologically useful phenomena which either (1) are fundamentally electronic in nature or (2) can be used to enhance the function of an electronic device or system (but may not be fundamentally electronic in nature themselves). The function of electronics can be performed in vacuum or inside of solid state matter. The latter has been the more intriguing and certainly the most exploited.

Electronics in the solid state, today, provides functionality over the entire range of the electromagnetic spectrum. To encompass this broad range of coverage a variety of materials have been used; both semiconductor and non-semiconductor type materials have played a part. In fact, the nature of much of fundamental electronics research done today is to either (a) discover a new kind of material or find a way to optimize an existing material for a selected application, or (b) to discover a new application for a selected material.

Many years of research of the first kind has led to the generation of a large realm of semiconductors which includes the classical elemental ones such as Silicon and Germanium, the III-V compound semiconductors and now the new ternary and quaternary material systems. The last evolutionary trend has moved the boundaries of semi-conductivity over a broader region of the periodic table with over 200 types of new semiconductors coming to be identified today. This factor alone has added much new life and potential for enterprise in the field of electronics.

Within the development of semiconductor devices, the model for the electron has occasionally needed to be modified to enable the design of new devices. The first such modification introduced the concept of the "hole" to explain the behavior of bipolar devices. Most recently, the modification has been to model the electron as a wave which obeys the Schrodinger equation and the laws of quantum mechanics. This has been essential in providing an understanding of the more recent device developments such as HEMT's (High Electron Mobility Transistors) and RTD's (Resonant Tunneling Devices).

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